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ABSTRACT

Designed to present interesting facts about science and to heighten the curiosity of primary age students, this book contains activities about the natural world and numerous black and white illustrations. The activities focus on butterflies and moths and their stages of development. The first section contains exercises on recognizing insect body parts and habits and the differences between moths and butterflies. Section two introduces the complete life cycle from egg to adult, with practical suggestions for locating and raising caterpillers common to most areas. Directives for the individual activities are provided in the parent/teacher guide section and include: (1) discussion questions; (2) explanations of the learning activities with an answer key; (3) vocabulary list; and in most cases, (4) extended activities. (ML)

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A GOOD APPLE ACTIVITY BOOK FOR PRIMARY GRADES

GOOD APPLE

YOUNG SCIENTISTS EXPLORE

Butterflies & Moths

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BOOK 4 PRIMARY LEVEL

SE 047 853

By Linda Penn Illustrated by Elaine Scott

YOUNG SCIENTISTS EXPLORE

BUTTERFLIES & MOTHS

BOOK 4 — PRIMARY LEVEL

By

LINDA PENN

illustrated by **ELAINE SCOTT**

cover design by **TOM SJOERDSMA**

music by **MARY BETH PENN**

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ALBANY, NY

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PREFACE

Fellow Teachers and Parents:

Butterflies hold a special fascination for children and adults alike. Of particular interest is the total change that occurs as a miniature egg hatches into a tiny crawling caterpillar. The hungry caterpillar will eventually outgrow several colorful skins to enter into the quiet and mysterious pupal stage. Ultimately, an empty pupal case reveals a beautiful adult butterfly, capable of flying. Now nature's miracle of metamorphosis, or complete change of form, can be experienced by children right at home or in the classroom with the help of **Young Scientists Explore Butterflies & Moths**.

The first section of the book promotes observational skills by making children aware of important insect body parts and habits; the children are thus able to recognize the general differences between moths and butterflies. Section two introduces the complete life cycle from egg to adult, with practical suggestions for locating and raising caterpillars common to most areas. Based on over ten years experience, this information is definitely "tried and true."

In keeping with practicality, only inexpensive and readily available materials are required to create a Butterfly Bungalow or Moth Mansion. These special houses are plastic and will promote healthy insects while allowing for easy observation (unlike the glass jars and coffee cans in popular use).

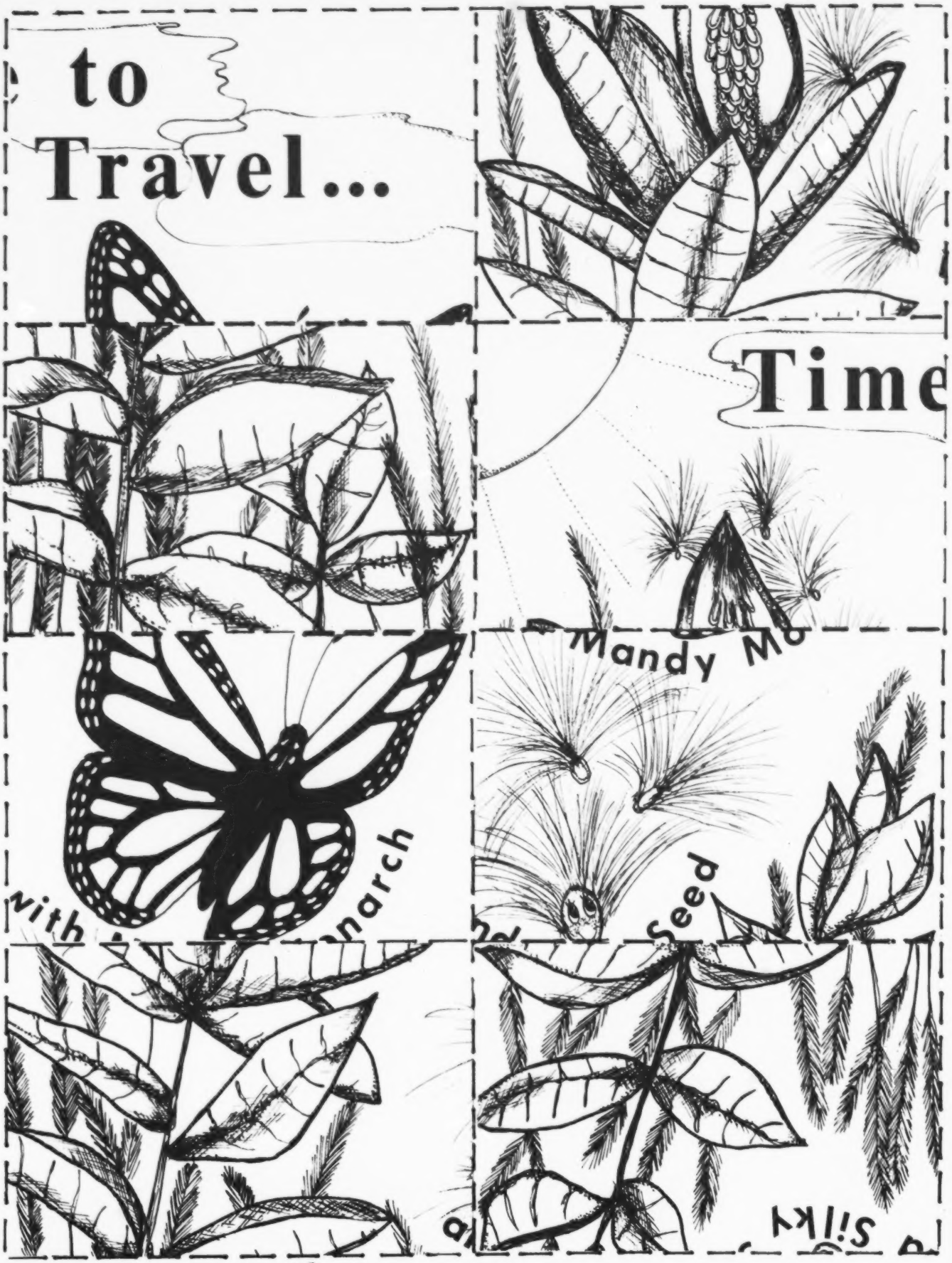
Close relatives of the "keepable caterpillars" described on pages 14 and 15, are listed in the Teacher/Parent Guide. These caterpillars occur in specific areas of the country not already covered and will assure availability of live specimens whatever the climate or location. You are strongly encouraged to utilize the Teacher/Parent Guide. It discusses, as well as explains, each activity page; provides easily understood scientific background; and offers workable suggestions for implementing exciting butterfly biology in your home or classroom. For your added convenience, all activity pages may be duplicated. The puzzles found on pages 1 and 25, when assembled, become attractive covers for the child's own butterfly booklet.

May you find, as I have, that exploring butterfly science with children yields learning dividends that will last a lifetime. Please don't hesitate to let me know if I can be of further assistance.

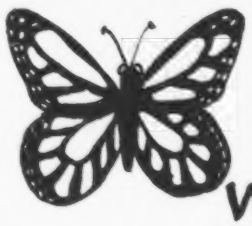
Sincerely,

Linda Penn

Reach out for the hands
of a curious child;
Share living science,
for it opens young eyes
To the wonder and beauty of life.


to
Travel...
Time
Mandy Mo
Seed

Pick a Picture Word

A  _ _ _ _ _ _ _ _ _ _

will fly by _ _ _ _.

Most moths must

fly at _ _ _ _ _ _.

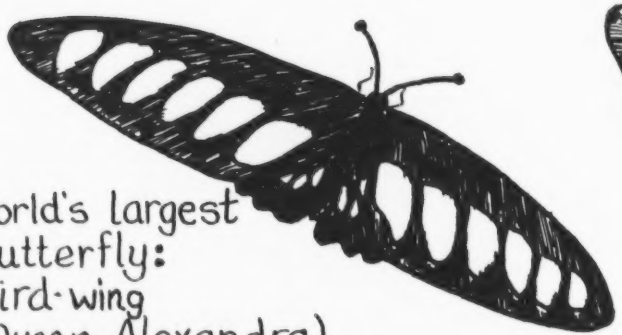
One _ _ _ _-flyer is so

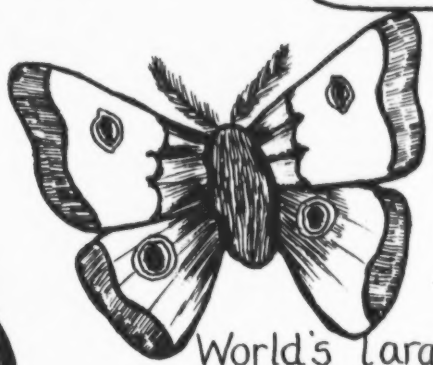
large, it's been flown

just like a _ _ _ _ _.

The Emperor holds the record
as the largest _____
that's known.
Its _____
smell the farthest
and the _____
is its home.

Look at the antennas just above each head. When ends are clubbed it's a butterfly. Feathered antennas will always mean a moth.

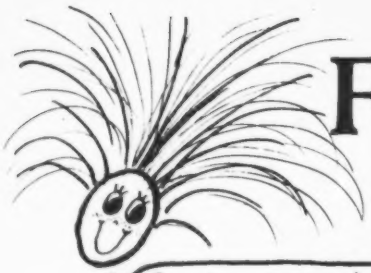

World's largest butterfly:
Bird-wing
(Queen Alexandra)
Wings: about 12 inches (31 cm.)


World's largest moth:
Emperor (Hercules)
Wings: about 14 inches (36cm.)

jungle

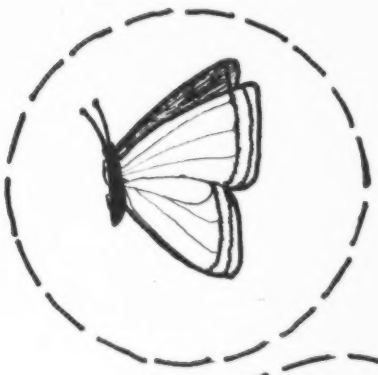
antennas

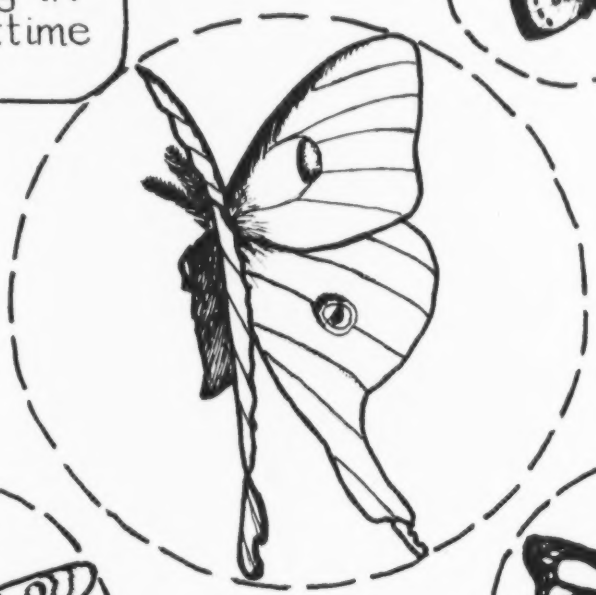
moth

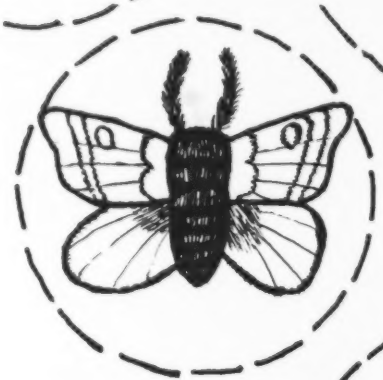


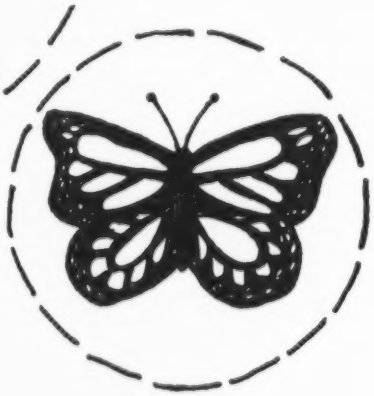
Flying Time

Cut out these moths and butterflies. Would they fly in a day or nighttime sky?

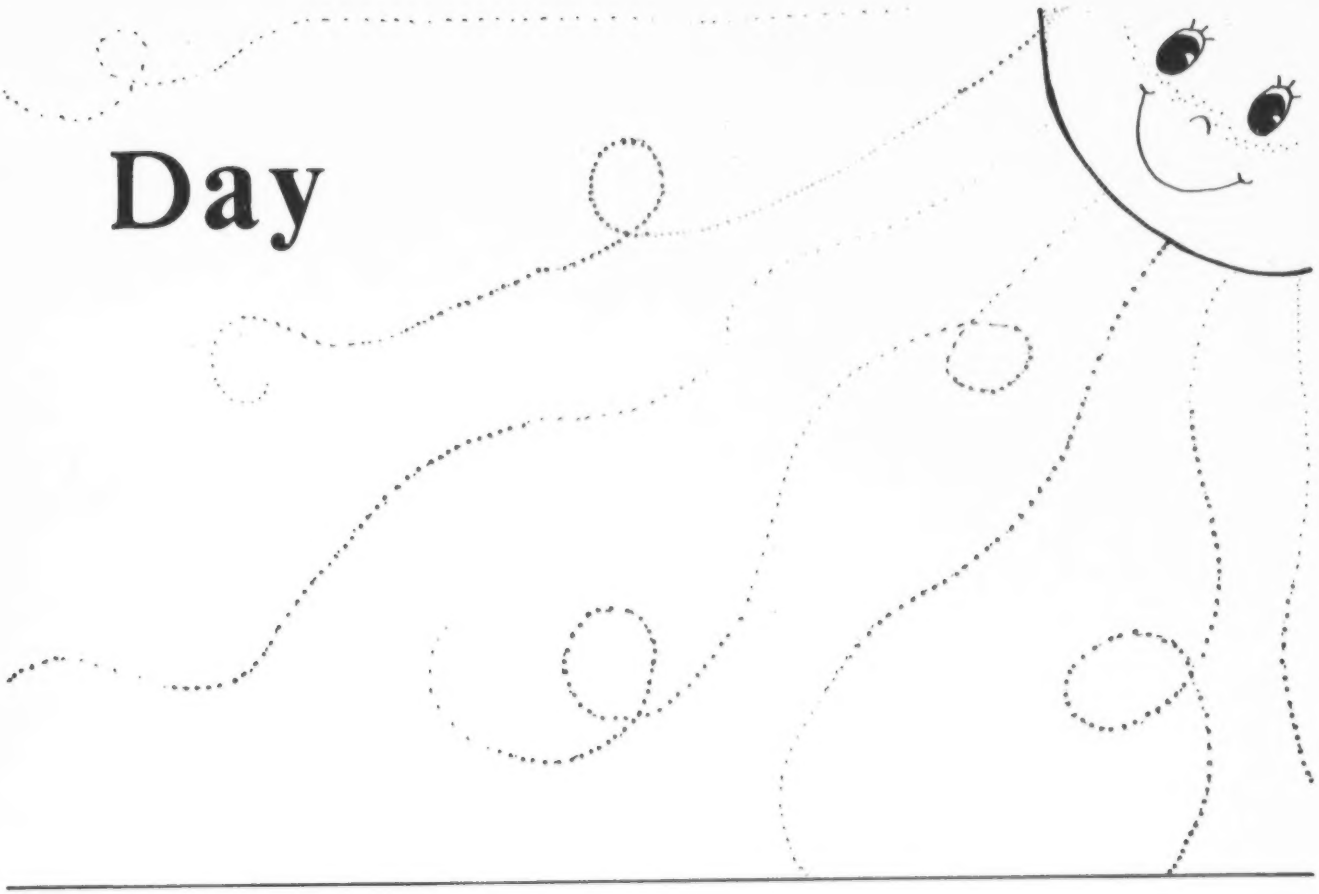


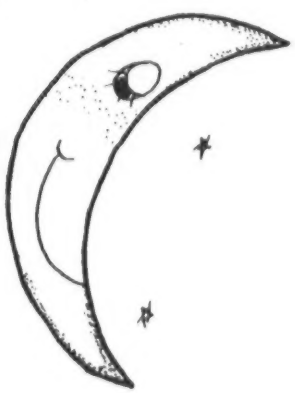






Day





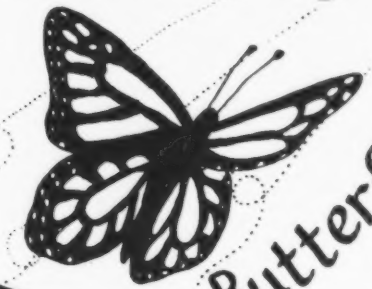
Night

Fly-a-Long for Fun

Silky Seed
has just set sail
in a milkweed
He'll lead the way
for learning fun
before setting down some roots.
Silky's friend, Amanda Monarch,
is flying SOUTH today.
She'll help you meet
the butterflies
as she travels on her way.

Once Upon a Summer Day...

We are the Monarch Butterflies.



name: _____

name: _____

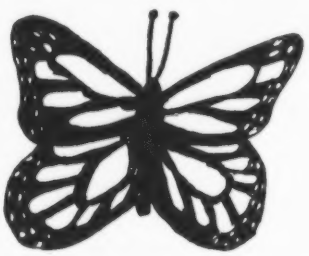
Our orange wings

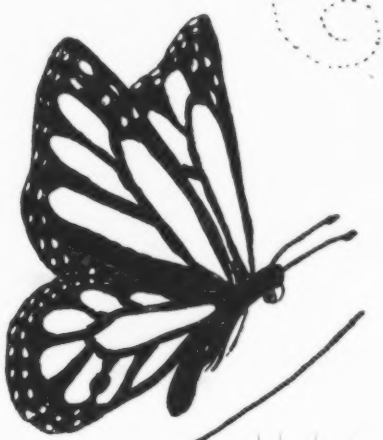
brighten daytime skies.

name: _____

Males and females,
we're not the same.

Spot the difference





name: _____

name: _____

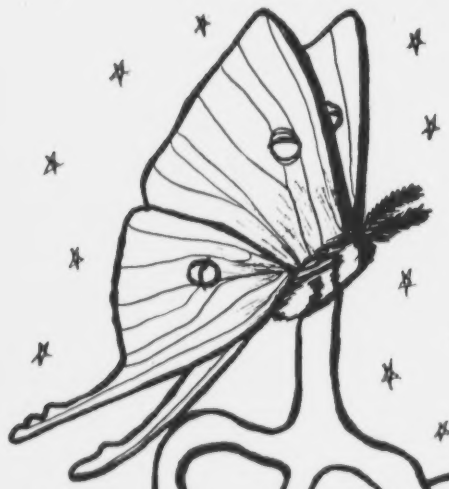
name: _____

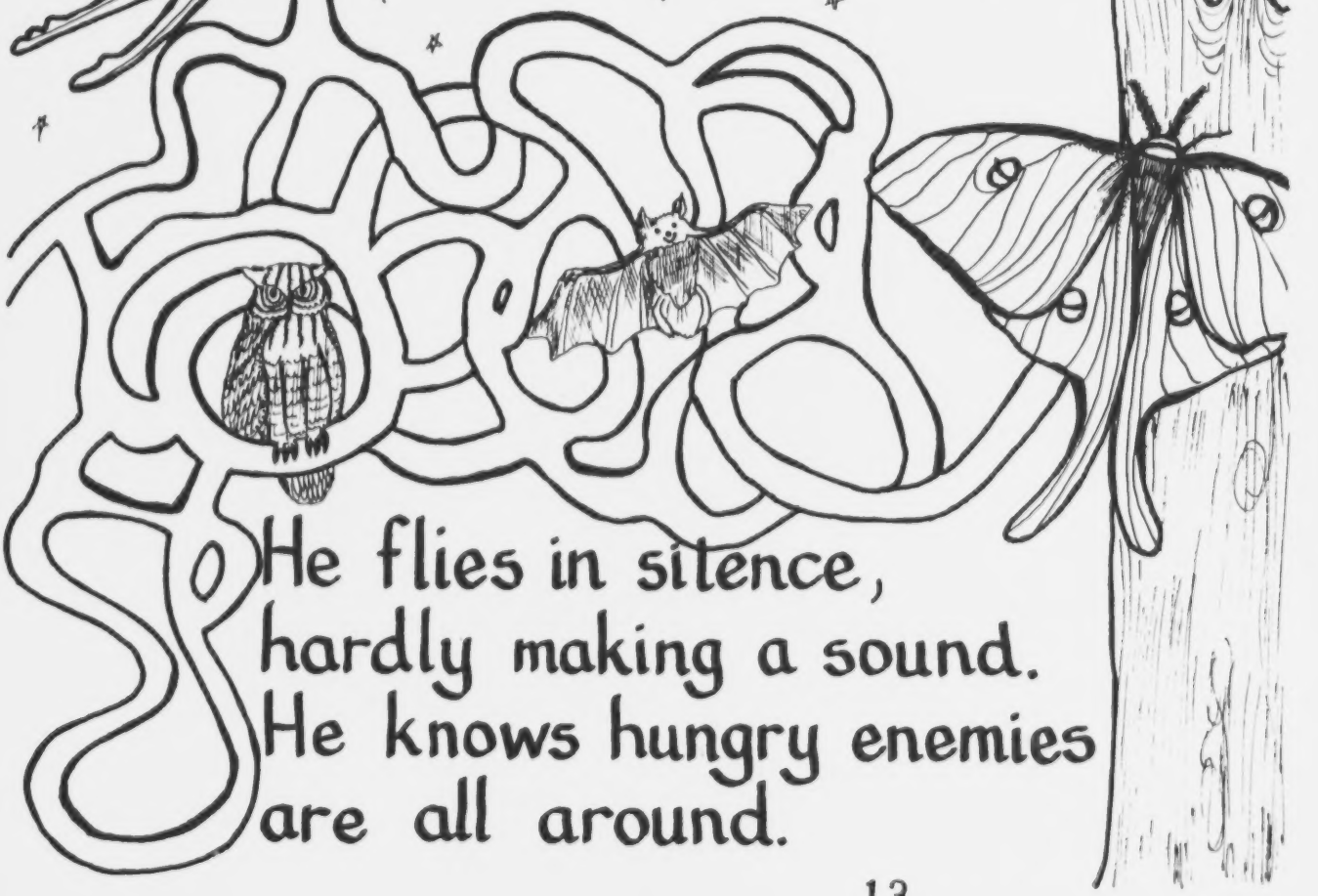
and give us a name.

Here's a hint! The male Monarchs have a perfume pocket on each of their bottom wings. Now play the Name Game!

Once Upon a Summer Night...

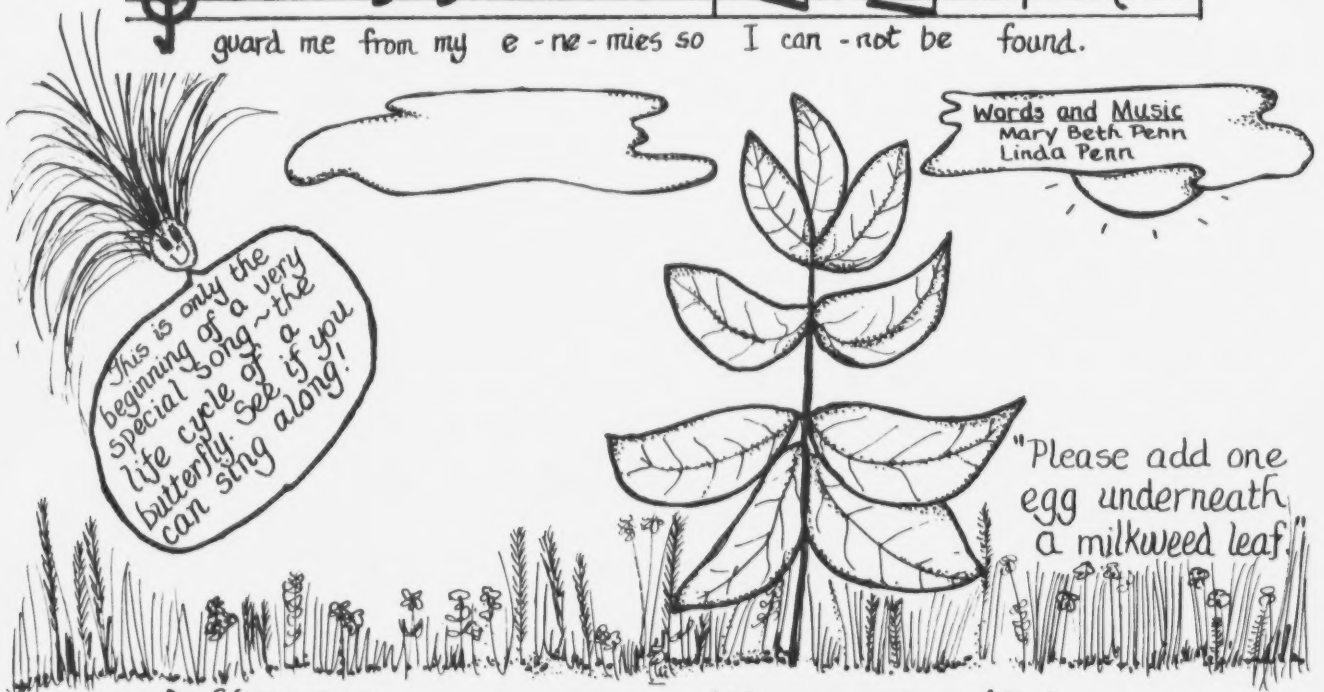
It's late at night.
The moon is bright.
A Luna Moth has begun his flight
.... to find a female
by her special smell
using large antennas
that smell so very well!





He flies in silence,
hardly making a sound.
He knows hungry enemies
are all around.

Becoming a Butterfly


Words and Music
Mary Beth Penn
Linda Penn
This is only the beginning of a very special song~the life cycle of a butterfly. See if you can sing along!
"Please add one egg underneath a milkweed leaf."

Egg Laying

"As Easy as One-Two-Three"

Once a male has found a female, they usually will mate (sometimes following a "flying dance"). Soon the female will lay eggs. She can hardly wait!

Egg Laying: Step One

The female finds a special plant
sometimes a weed, a bush, a tree.
Her antennas help by smelling.
Compound eyes will help her see.

Step Two

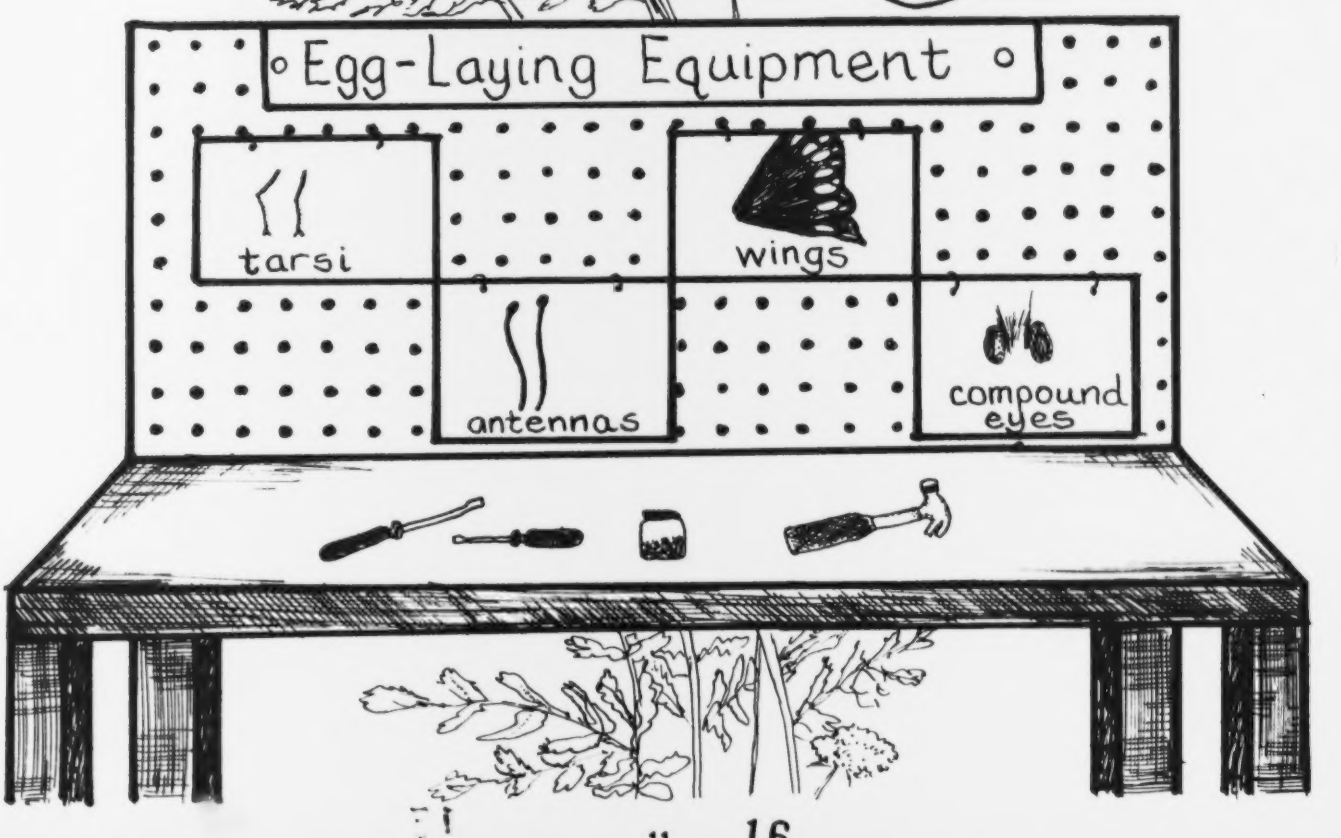
The female makes a final check
on the weed, or bush or tree,
using legs with little tasters,
tiny hairs we call tarsi (TAR-see).

Step Three

The female lays a single egg.
[Some moths even lay a score! (20)]
Soon she flies to other leaves,
on which she lays some more.

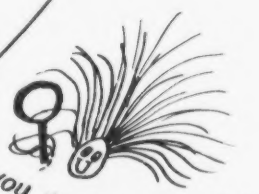
Build a Butterfly

Cindy Swallowtail just laid an egg. Draw a line from the workbench picture to the part of the butterfly's body that helped her find this carrot plant.



Butterfly Song,
cont'd.

Magnified Milkweed Leaf



If you used a powerful magnifying glass, this is how a Monarch would look when it first hatches. Can you draw eating its empty eggshell?

Here are some drawing hints:
The Monarch has 13 parts or segments. Make a segment with two straight lines, then add a rounded top and bottom.

Put two hairs at the top and dots down the middle, pointed legs on front 3 segments, rounded legs in middle and back. The head is round and black; the body light green.

(C) (F)
Verse 2 Af-ter sev-eral days I crawl out through the top of my
(G) (G7) (C)
egg-shell made of chi-tin, then I turn a-round and stop. To
(C) (F)
eat the spe-cial meal that na-ture planned for me. My
(G) (G7)
egg-shell's packed with pro-tein and it's good for me you see.

Caring for Caterpillars

Are you ready for some exciting science? Follow my "caterpillar clues" and raise beautiful butterflies and moths!

with keepable Caterpillars

Here's what they look like, plus where you should look. Color each picture carefully for a Caterpillar Guidebook.

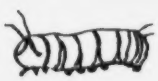
Where to look for Monarchs on Milkweed Plants

Be sure to check fields or weedy vacant lots. Small knee-high plants can be the best spots. For Monarch eggs (and caterpillars, too) look under each leaf; one's waiting for you!

Color Guide to Keepable Caterpillars

Monarch

Looks like this:

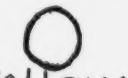
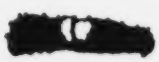
white or yellow	egg-shaped and colored
White caterpillar with black and yellow striping.	
	Very young are cream-colored with black pinstripes.

Will usually be eating:

	Milkweed with green leaves
Plant has sticky white liquid inside stem. Pink flower clusters with silky seed pods in fall.	

Silky says: Try growing milkweed seeds like me in your very own "Butterfly Garden". I grow best planted in sandy soil with plenty of sunshine.

Black Swallowtail

 yellow	egg-shaped and colored
Green caterpillar with black bands and yellow circles	
	Very young are black with white saddle as shown.

Plants in the Carrot Family i.e. carrot, parsley, dill, fennel, anise.

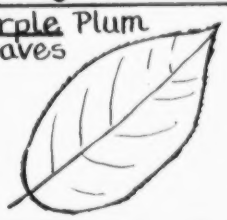
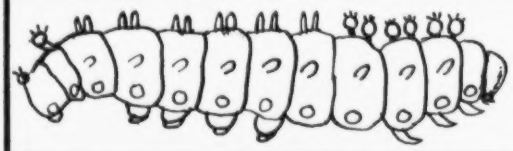
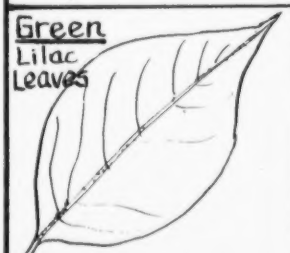
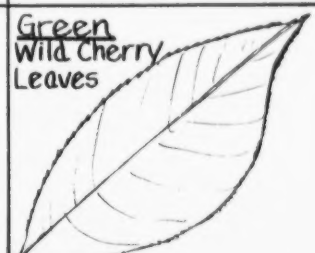
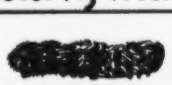
Wild Carrot	Flower is white. Leaves are green.

Most flowers which produce seed in Carrot Family are umbrella-shaped. Wild flower pictured above is called Queen Anne's Lace.

Silky says: It's easy to grow plants in the carrot family. Try some in your garden and be on the lookout for this interesting caterpillar with the yellow circles.

Color Guide continued

Cecropia Moth

Looks like this:		Will usually be eating:	
beige and brown	egg-shaped and colored	Green Pussy Willow Leaves	Purple Plum Leaves 
 Bright green caterpillar Tubercles: front four red, then yellow, with blue along side.		Green Lilac Leaves 	Green Wild Cherry Leaves 
	Very young are black and fuzzy.		

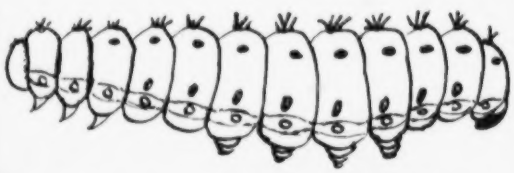
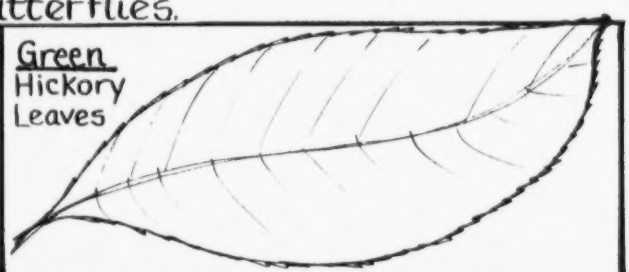
Silky says: "This beautiful moth's silken cocoon [KA-COON] can be found attached to bare tree branches in winter or early spring.

Woolly bear Moth

Fuzzy caterpillar is black in front and back, with brown band in the middle of the body.		Feeds on carrot as well as many other plants.

Silky says: This well-known caterpillar becomes an Isabella Moth and is fun to raise. However, avoid putting fuzzy caterpillars (usually moths) with smooth skinned butterfly caterpillars because the moths are active at night and might eat the sleeping day-active butterflies.

Luna Moth

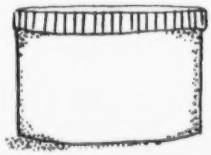
 Bright green with red markings.	Green Hickory Leaves 

Silky says: This is my favorite moth. As a grown-up adult moth, it is very lovely with pale green wings. (See page 8 for a good look.) When this caterpillar makes its cocoon, it fastens leaves around the outside and can be found on the ground by its favorite tree, the Hickory.

Get Set...

What to Get:

Large Plastic Container (128 oz. (4 liter size)



Dark colored netting for easier observation, as light colors obscure view.

Small jar, baby food type

Where to Get It:

Empty containers available at delicatessens.

Purchased inexpensively at fabric stores. (½ yd. per container) Usually made of nylon.

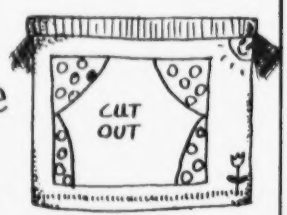
Collectible item

You will also need: washable, clear-drying glue, a good pair of scissors and colored permanent markers.

How to Build a Butterfly Bungalow or Moth Mansion

Cut hole in plastic lid of large container, leaving about one inch (1 inch) of plastic around the rim.

Draw outline of curtained window on side of container as shown and cut out center. Have children decorate curtains with permanent markers, and then add trees, grass, sun, flowers, etc., to the side panel.

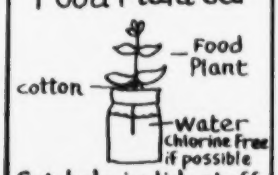


Cut a 6 in. x 6 in. piece of netting, adding a line of glue around outside of drawn window. Then place netting against window. Cut 12 in. x 12 in. piece for top of container and replace lid.

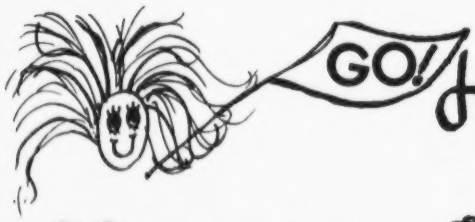
You have just completed an insect house which has the...

Successful Science SEAL of Approval

Preparing Food Plant Jar



Cut hole in lid; stuff with cotton after inserting food plant required.



Happy Hunting Hints

"Do's and Don'ts"

DO take along a food plant jar (page 16) filled with water. Block hole in lid completely to prevent spilling.

DON'T forget to wear LONG pants.

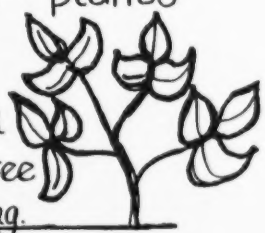
DO take a pair of to snip plant stems. Snipping helps the plant grow new leaves.

DON'T pull plants from ground. They will wilt quickly and uprooting prevents new plant growth.

DO look for chewed leaves and tiny black droppings - sure signs of feeding caterpillars.

DON'T get near plants such as Poison Ivy

Green (or yellow and red) leaves with three leaflets, often vining.

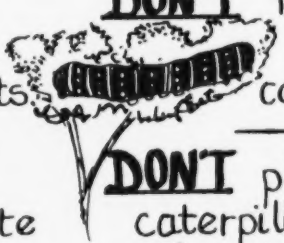


DO check for milkweed and Monarchs in vacant lots, farmers' fields and along railroad tracks (with an adult).

Look back at page 13 and . . .

DON'T forget eggs and caterpillars are usually found on young milkweed plants.

DO check gardens for Black Swallowtails on carrot and parsley plants.



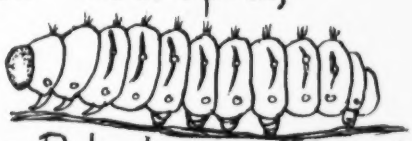
DON'T forget to look under leaves. These caterpillars usually hide.

DO look for Woolly-bear caterpillars in late summer. Can often be found on the ground in wooded areas.

DON'T place these caterpillars with other insects. They must be kept in separate containers.

Happy Hunting continued

DO look for Cecropia [Sa-CROW-pee-a] around the trees it feeds upon. (Check Color Guide, page H.) In late summer these large caterpillars can be found searching for spots to make their cocoons. Two relatives of the Cecropia,



the Polyphemus [Polly-PHEE-mus] and its "city cousin", the Cynthia [SIN-thee-a], can also be found in late summer. The Cynthia looks something like the Cecropia except all its tubercles are blue. This moth feeds on the Ailanthus, or "Tree of Heaven", which thrives in the inner city.

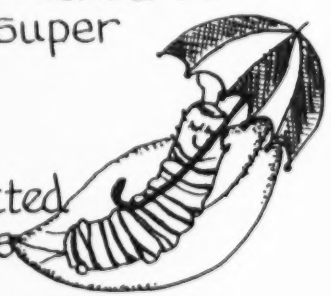
DO keep your caterpillars well-fed with fresh leaves and clean out droppings daily. A paper towel underneath the food jar provides easy cleanup.

DON'T keep any caterpillars with white eggs stuck to their backs.

These are parasites [PARE-a-sites] and will destroy the caterpillar when the eggs hatch. (They cannot be removed.) Certain wasps and flies depend on caterpillars as food for their young. If this didn't happen, there would be too many caterpillars and the trees might be destroyed by their eating.

DON'T forget to check new leaves before adding to food plant jar. Wash leaves if necessary. Other insects on the leaves could be enemies.

DON'T place in direct sunlight. A screened-in porch is a super spot!



DO place your caterpillar house in a protected area outdoors or a well-ventilated room indoors.

Becoming a Butterfly (cont'd.)

(C) (F)

Verse 3. I'm a ca-ter-pill-ar. Green leaves suit me fine. I

(G) (G7) (C)

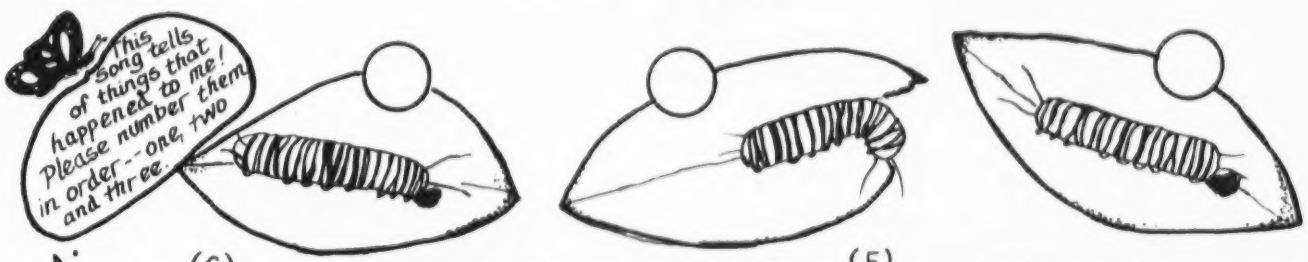
munch a- way all through the day. I'm eat-ing all the time.

(C) (F)

I will ne-ver stop un- til my skin feels tight, then I'll

(G) (G7) (C)

make a lit-tle stick-y silk and wig-gle left and right.



(C) (F)

Verse 4. I've molt-ed my old skin so I stop to dry and rest. Soon I'll

(G) (G7)

eat the skin that cov-ered me. It's the pro-tein I like best. Then

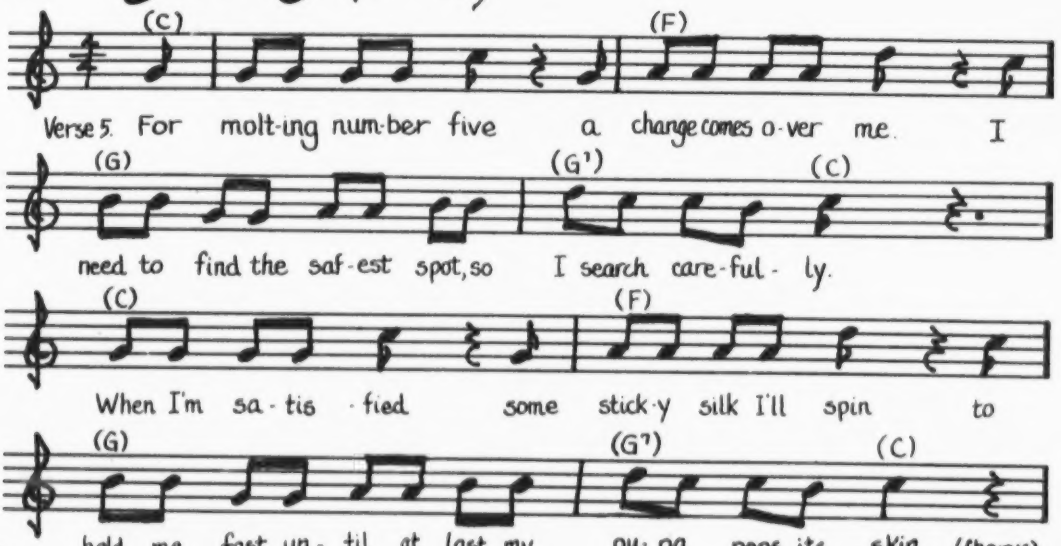
(C) (F)

back to munch-ing leaves un- til my skin's too small. I'll

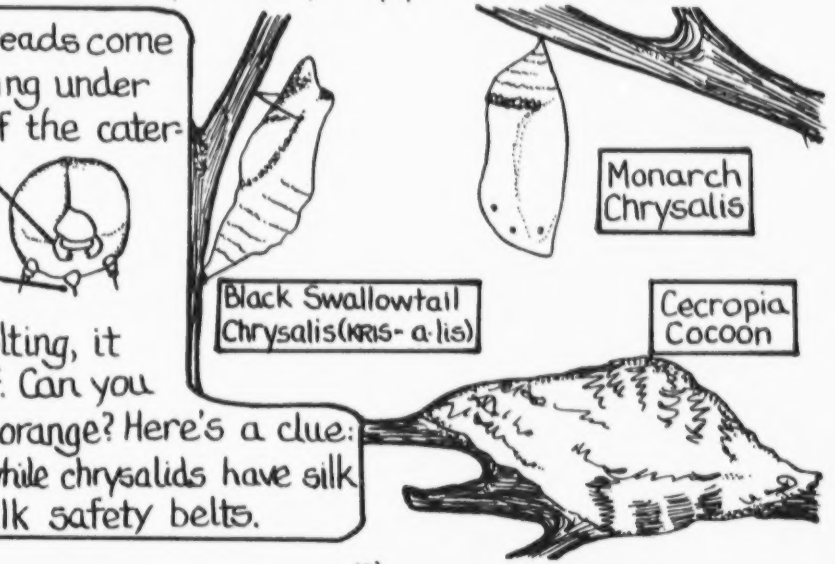
(G) (G7) (C)

have to molt at least five times or I won't grow at all.

Butterfly Song (cont'd.)

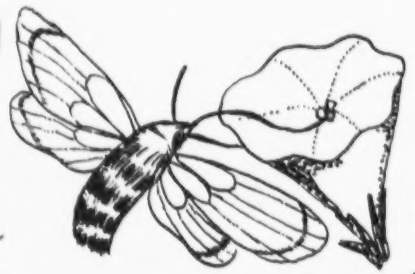


Silky says: Silk threads come from a small opening under the chewing jaws of the caterpillar. This important body part is called a spinneret. When it is time for the caterpillar's last molting, it uses silk to attach itself. Can you find the silk and color it orange? Here's a clue: cocoons are mostly silk while chrysalids have silk buttons and sometimes silk safety belts.



Picture It Dictionary

What is a proboscis? [pro-BAH-sis]
A tubelike tongue which works like a bendable soda straw. A butterfly's proboscis sucks up water and sweet flower nectar.

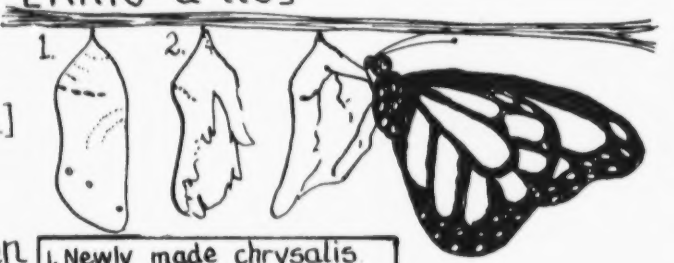


Hummingbird Moth

Monarch Butterfly

...and even an elephant

What is a chrysalis? [KRIS-a-lis]
A clear case forming the protective outer covering of a pupa. [PEW-pa] An adult butterfly will emerge from a transparent "see-through" chrysalis when it has completely formed.

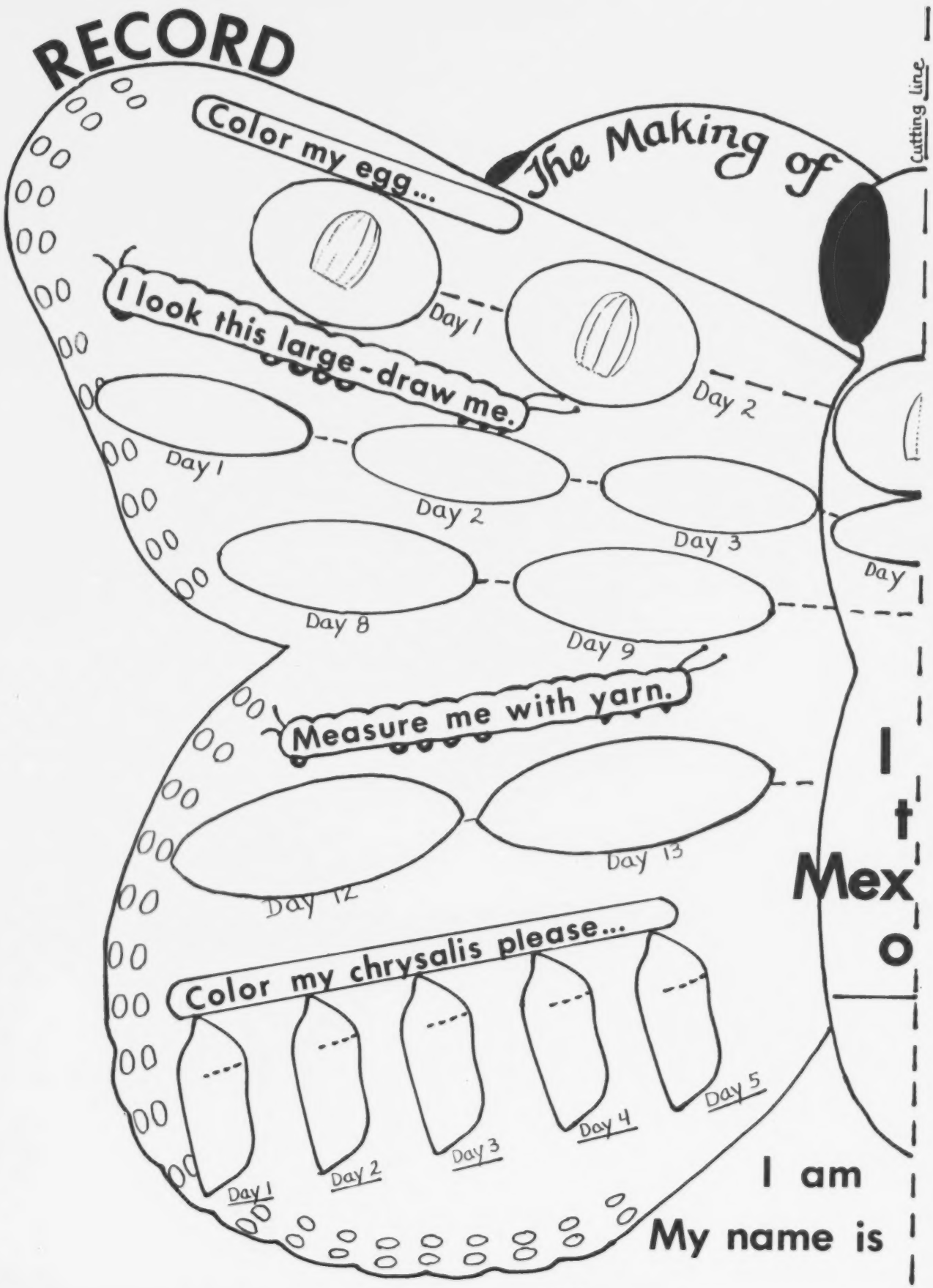


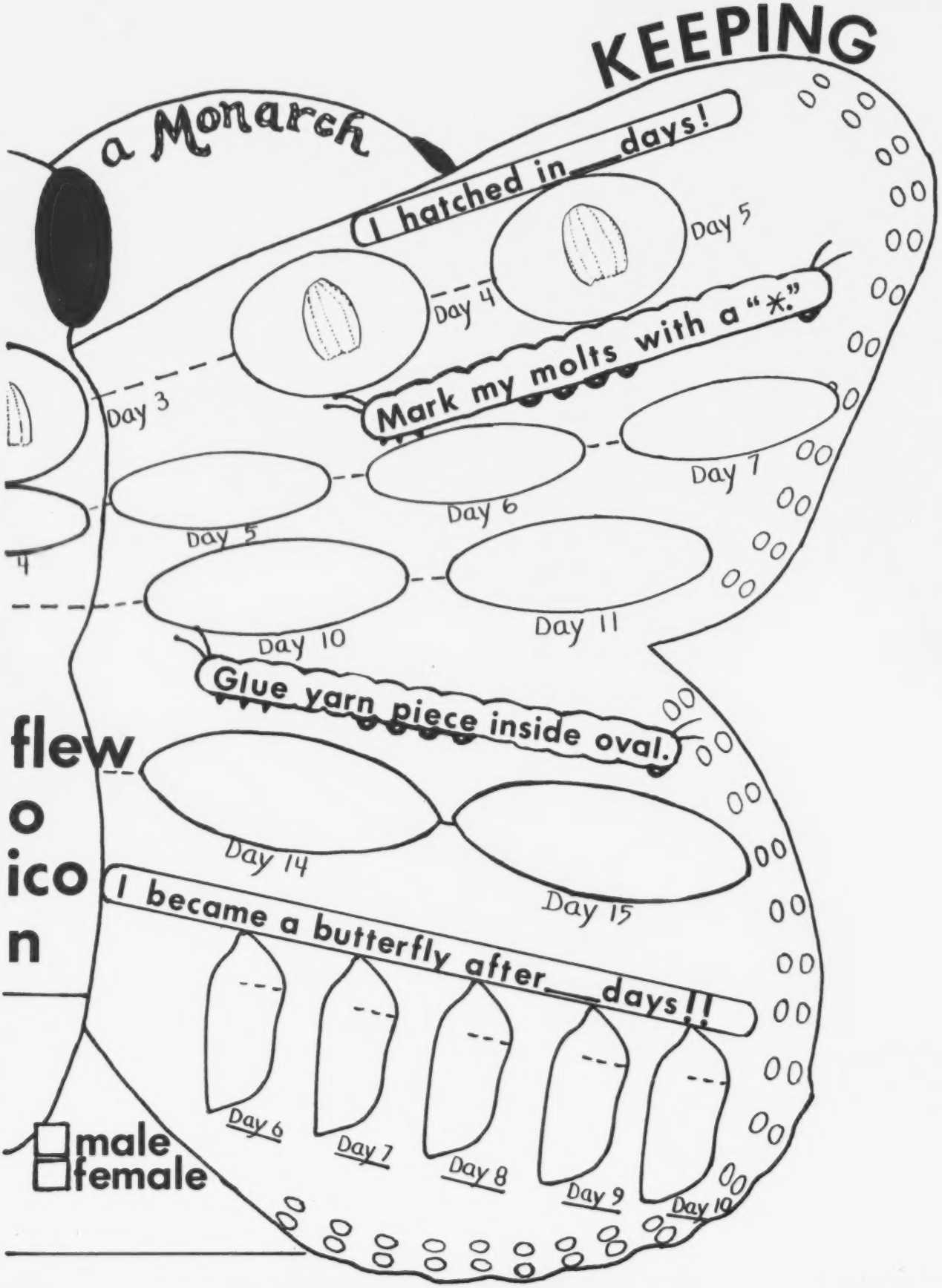
1. Newly made chrysalis
2. Emerging Monarch adult.

What is a cocoon? [ka-KOON]
A moth caterpillar spins a case of silken thread to protect itself when it changes into a pupa. The cocoon often includes leaves or caterpillar hairs so it is not easily seen.

Woollybear Cocoon

Luna Moth Cocoon

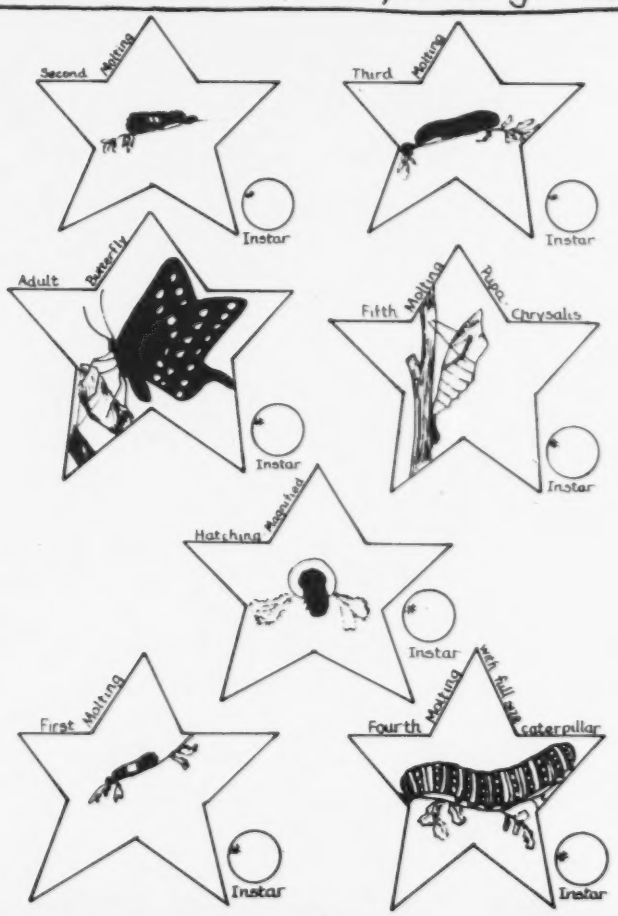

RECORD
The Making of
Color my egg...
Day 1
I look this large - draw me.
Day 2
Day 1
Day 2
Day 3
Day
Day 8
Day 9
Measure me with yarn.
Day 12
Day 13
Color my chrysalis please...
Day 1
Day 2
Day 3
Day 4
Day 5
Cutting line
I t
Mex
o
I am
My name is

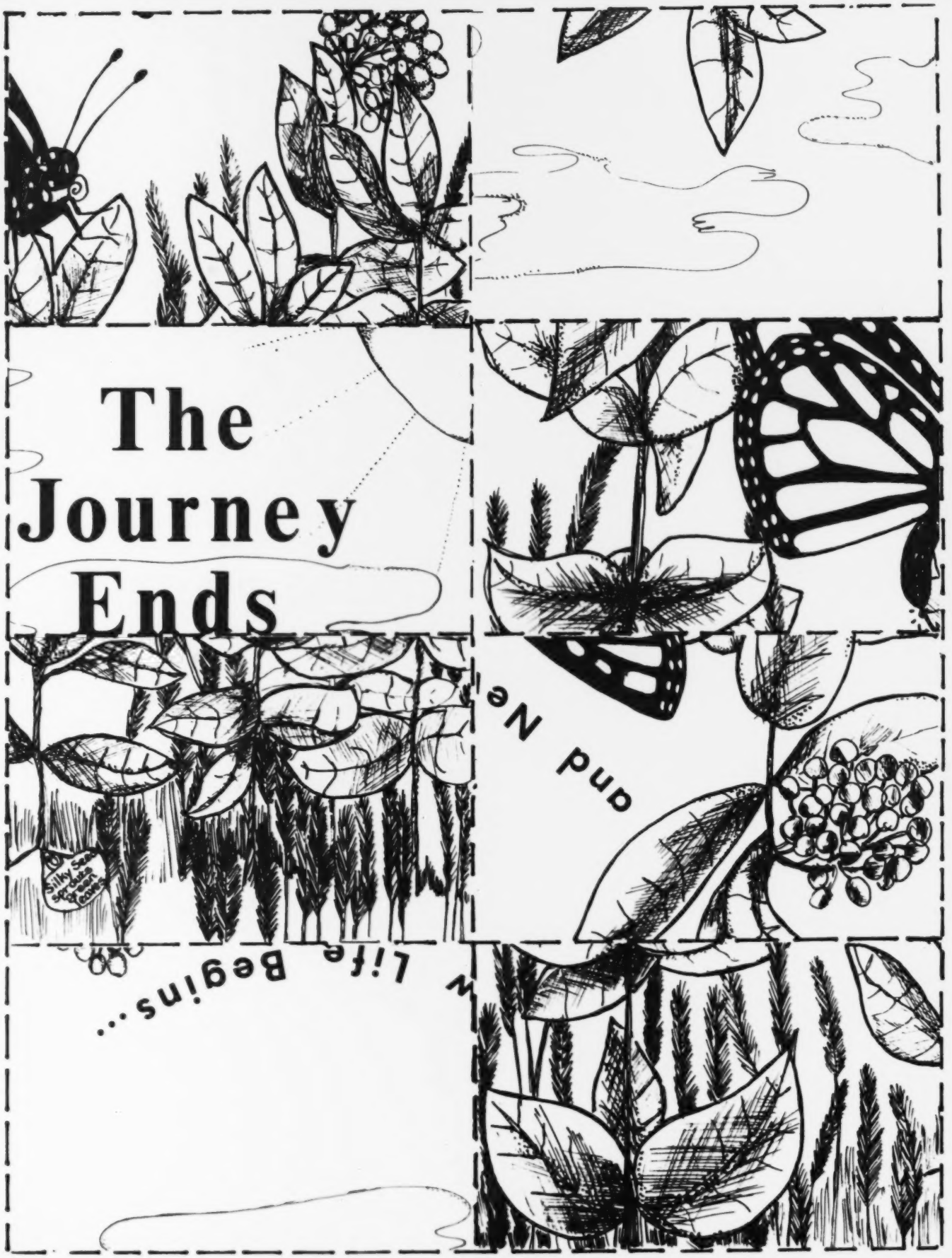

KEEPING
a Monarch
I hatched in ___ days!
Day 4
Day 5
Mark my molts with a "*."
Day 3
Day 6
Day 7
Day 5
Day 10
Day 11
Glue yarn piece inside oval.
flew
o
ico
n
Day 14
Day 15
I became a butterfly after ___ days!!
Day 6
Day 7
Day 8
Day 9
Day 10
male
female

Birthday "Instars"

A butterfly's life is rather short
from the moment that it starts, but
<u>seven</u> changes must take place
and each change a birthday marks.
An "instar" is the special name
that marks each change you see ~
<u>one</u> hatching plus <u>five</u> moltings,
before <u>one</u> butterfly there'll be.

Cindy Swallowtail is pictured from her first to last instar. Number each change and give it a name. See if you can get that far!




The Journey Ends
and New Life Begins...
Silky Seal produces eggs on milkweed leaves.

TEACHER/PARENT GUIDE

TIME TO TRAVEL (p. 1)

DISCUSSION: Can the children name some **nonliving** things that travel through the air when pushed by an engine or blown by the wind? (airplanes, spaceships, rockets, kites, parachutes) These are **nonliving** because they **cannot grow or change by themselves.**

Have the children name some **living things** that travel through the air... birds, bees, butterflies. Even the seeds of some plants find a place to **grow** by traveling through the air. The milkweed is one of these seeds. With a parachute-like top it can easily be blown by the wind from its seedpod near the top of the milkweed plant.

LEARNING ACTIVITY: The activity pages begin with a picture puzzle featuring a butterfly named Mandy Monarch and Silky, a milkweed seed. (Mandy and Silky travel throughout the book introducing the children to some fascinating science.) Glue the completed puzzle on the tagboard; it can be a cover for the child's own booklet of butterflies and moths. The following instructions should be followed by the children for the best results:

(1) Cut out pieces carefully along broken lines.

(2) Assemble puzzle.

(3) Spread rubber cement or glue **on only** the upper half of the tagboard.

(4) Press down the top half of the puzzle, one piece at a time.

(5) Follow the same procedure for the bottom half.

Once the glue has dried, the picture can be colored.

Color Chart	
Milkweed leaves	= green
Seeds and seedpods	= brown
Monarch wings	= orange
Wing border, as shown	= black and white

VOCABULARY: Nonliving, living, grow, change, Monarch butterfly, milkweed plant, seed and seedpod

See page 30 for the back cover puzzle discussion.

PICK A PICTURE WORD (pp. 2-3)

DISCUSSION: When did the children last see a butterfly? Was the sun shining warmly? Have the children seen butterflies on cloudy or cool days? Actually a butterfly's wings cannot fly without the warmth of the sun; thus, butterflies are active, flying and feeding on flowers, during the sunny daytime hours.

A butterfly sitting quietly in the sun, opening and closing its wings, is trying to get warm. Hollow tubes or veins, very much like tiny soda straws, are in the butterfly's wings. These veins fill with cold blood and the sun warms the blood while the wings are open. When the wings close, the warmed blood is sent back into the butterfly's body past the wing muscles. This happens over and over until the muscles are warm enough to move the wings for flying. Since butterflies are cold-blooded, sunny days are an important part of their lives.

LEARNING ACTIVITY: Do the children think they are warm or cold-blooded? Can our bodies make themselves warm or do we have to sit in the sun before we can walk or run? Take a child's temperature with a thermometer. Then check the room temperature and write down both results for the children to see. Which is warmer, the child or the room? Where does the extra heat come from? Living things that are cold-blooded can never be warmer than the air around them unless they use something else to make them warmer. The butterfly uses the sun.

Most moths like to fly on summer nights and do not need the daytime sun for warmth. Like the butterfly they are cold-blooded, so moths have a special way of exercising wing muscles (looks like shivering) to make them warm enough for flying. Suggest the children run in place for a period of time. Does exercising their leg muscles make the children feel warmer or colder?

Moths and butterflies come in all sizes as do boys and girls. Who is the tallest boy in the class?....the shortest girl? Check by measuring. The bird-wing butterfly lives on a jungle island and is so large the native children fly it like a kite by tying a string around its body. What would it be like to fly a **living** kite?

The world's largest moth, the Hercules, also lives in the jungle and belongs to a family called Emperor Moths. Like most large moths, the Emperor has antennas on its head that look like small bird feathers. One member of the Emperor family holds the record for smelling the farthest with its feathery antennas. It is able to smell another moth's perfume over a distance of six miles even with the wind blowing the smell in the opposite direction. Could you smell your mother's perfume if she were across the street from you? Experiment using a fan and some perfume placed a distance away. How close must a child be to smell the perfume when the fan is blowing the smell away? What does this tell us about the Emperor's powerful antennas and our noses?

Butterflies use antennas for smelling, too. They do not have feathered antennas like some moths. A butterfly's antennas will always be "clubbed" (larger at the tip).

Answer Key: (p. 2) butterfly, day, night, day, kite

(p. 3) moth, antennas, jungle

EXTENDING ACTIVITY: Play "Warm-Ups!" In this game the children imitate a butterfly and moth warming their wing muscles for flying. If the leader calls "Butterfly," the children should pretend to slowly open and close their wings by stretching their arms out to their sides and then, with arms still extended, bringing their hands together above their heads. On a call of "Moth," arms are also outstretched but should appear to be shivering. Then the arms are dropped to the side indicative of a resting moth, warmed and ready to fly.

VOCABULARY: hollow tubes, veins, blood, wing muscles, cold-blooded, warm-blooded, temperature, exercise, shivering, Bird-wing, Hercules, Emperor, antennas, feathered, clubbed

FLYING TIME (pp. 4-5)

DISCUSSION: Looking at the pictures on page 4, can the children spot two differences that will help them tell a moth from a butterfly? (antennas, size of body)

LEARNING ACTIVITY: Have the children cut out the butterflies and moths and glue them in the day or night sky.

Answer Key: Day Sky (4) — All narrow-bodied insects with clubbed antennas are butterflies.
Night Sky (4) — All the insects with a wider body and feathery antennas are moths.

EXTENDING ACTIVITY: Diurnal (dy-ER-nel) is a name given to living things that are day-active. Nocturnal (nock-TER-nel) means active at night. Here's a little poem that includes a trick for remembering these special words:

Diurnal means Day-active
while Nocturnal means at Night;
Remember the starting letters
and you'll always get them right.

Have the children bring in pictures of living things that are diurnal or nocturnal. Display them on a bulletin board which has been divided into two sections: one-half for daytime with a picture of the sun, the other with the moon and stars for night.

VOCABULARY: narrow, wide, diurnal, nocturnal

FLY-A-LONG FOR FUN (p. 6)

DISCUSSION: Have the children ever seen the orange and black Monarch Butterfly? This strong flyer is well-known because it travels hundreds of miles in the fall, just like the birds, to a winter home in the South. When a **living thing moves from a cold-weather climate to a warmer location,** what do we call that? (migration) The Monarch is a famous butterfly migrator and holds the world's speed and distance records. It has been known to fly up to 20 miles in one hour, which certainly makes it the fastest butterfly around. Can the children imagine running 20 miles in only one hour? For very young children use known landmarks to aid their understanding of distance and time. Ex: "Could you run from here to_____in the time it takes to watch **Sesame Street**?" (It is interesting to note that some Monarchs fly up to 1800 miles on their migratory route from northern Canada to the mountains in Mexico.)

LEARNING ACTIVITY: One of the reasons this butterfly is such a traveler is because milkweed, the food plant of the Monarch caterpillar, grows wild almost everywhere. If you think milkweed might be growing in a field near you, have the children try this test. Break a leaf from the plant stem. If a sticky white liquid runs down the stem, they have found milkweed; this milky looking liquid gives the plant its name.

In the fall, large green seedpods are seen at the top of the tall, fully grown milkweed plants. These seedpods will turn brown and break open when the seeds inside are **ripe** and **ready to grow** new milkweed plants. The seeds look like little parachutes when the wind blows them from the pod.

It is interesting to do the following with a ripened seedpod: While the children watch, blow a single seed, with silk parachute attached, up into the air. Ask what part of the seed first touched the ground. Why? If possible, let each child blow a seed to test if the heavier part of the seed always reaches the ground first. If there is an open outside area, let the children be the wind and blow all the seeds from the pod. Should the seeds find a spot to grow, there will be more milkweed plants and the children have helped the Monarch Butterfly.

VOCABULARY: fall, winter, South, cold-weather climate, migration, Mexico

ONCE UPON A SUMMER DAY... (p. 7)

DISCUSSION: "Female is another name for a__?__, while male means a__?__." Very often you can tell a male butterfly from a female by noticing their wings. The Monarch male and female have the same color wings; but the male has a little something extra on his bottom wing, a small perfume pocket that looks like a black spot. When the Monarch male wants a female to notice him, he fills the pocket with a special perfume.

LEARNING ACTIVITY: Have the children look for the perfume pockets on the bottom wings of the Monarchs pictured on page 7. Each should write a boy's name under every male and a girl's name under each female. This will be good practice for later when the children will want to tell the difference before naming the Monarchs they have raised.

Answer Key: There are two females pictured. One is on the upper right, the other in the middle at the bottom. The remaining four Monarchs are males with perfume pockets on their bottom wings.

VOCABULARY: female, male, perfume pocket

ONCE UPON A SUMMER NIGHT... (p. 8)

DISCUSSION: In larger moths like the Lunas pictured on page 8, it is possible to tell a male from a female by looking at the antennas. Do the children recall how butterflies and moths use their antennas? Remember the Emperor Moth that was able to smell perfume from over six miles away? Since it is the male moth that must find the female, the **males** have **larger** and **wider antennas**. Look at the Lunas on page 8 again. Can the children tell the male from the female?

LEARNING ACTIVITY: All the living things on page 8 are nocturnal or active at night. The owl and bat like to feed on night-flying insects so the Luna Moth flies as silently as possible, while using his large antennas to smell the female's special perfume. The children can help the Luna male by solving the maze and avoiding the hungry enemies.

Answer Key:

VOCABULARY: Luna Moth, bat, owl

BECOMING A BUTTERFLY (pp. 9 and 12)

DISCUSSION: Encourage the children to discuss everything they have learned about the beginning of a butterfly. (male, female, mating, egg laying) When a female Monarch lays an egg underneath a milkweed leaf, she leaves a little perfume on the leaf. Other egg-laying females smell the special perfume with their__?__, and they look for a different plant since there will be only enough food on that one plant to feed one caterpillar.

As soon as it hatches, the caterpillar will eat its eggshell; the eggshell is made of an important protein called chitin (KITE-in), which is good for the caterpillar. What do the children think might happen if two eggs were laid on the same leaf and one hatched before the other? Another caterpillar could easily become an enemy of the egg. Moth eggs laid in bunches belong to caterpillars that don't usually eat their eggshells. Other hungry enemies of an egg are ants, spiders and beetles.

LEARNING ACTIVITY: Children enjoy learning this special song about butterflies and completing the activities suggested by each verse. On page 9 a single egg is added underneath one of the milkweed leaves. Page 12 pictures a magnified leaf and empty eggshell, but the newly hatched Monarch is missing. By following the drawing hints, the children can supply the missing caterpillar just as it would look eating its empty eggshell "packed with protein."

VOCABULARY: eggshell, protein, chitin, ants, spiders, beetles, magnified

EGG LAYING and BUILD A BUTTERFLY (pp. 10-11)

DISCUSSION: The body of the **female** butterfly or moth **has many eggs**, sometimes 300 or more. Unless a male finds a female, her eggs will never be living caterpillars since he must give her something to make the eggs hatch. **Males and females** are important, if there are going to be more butterflies and moths. Can the children recall two ways of telling a male from a female? (antennas, perfume pockets)

After a male finds a female sometimes they are seen "circle dancing" in the air. If the butterflies like each other they will mate; the male then places a small sack inside the female's body. Following mating the male flies away and the female starts looking for a food plant on which to lay her eggs.

Can the children name the body parts that help a female find the right plant? She has__?__for flying and__?__for smelling. The female also has large **compound eyes**; each is made up of many small eyes rolled into one. With a compound eye on both sides of her head, the butterfly can see very well and in all directions (front, back, up, down, sideways). Once she has found a plant, she **tastes** the leaves with tiny hairs on her legs called **tarsi**. It may sound silly to taste with legs, but there is a very good reason for this. Ask the children what part of the butterfly first touches a plant? It is important these leg tasters let the butterfly know she is on the right plant **immediately**, so she can quickly hide her egg and move on before enemies spot her or the egg. Usually butterflies will lay one egg at a time, but many moths lay bunches of eggs. As each egg is laid by the butterfly or moth, it is fertilized and becomes a living thing, all because of the special sack the male placed inside the female's body.

LEARNING ACTIVITY: The important body parts used by a female to locate the right food plant are pictured with the workbench on page 11. The children should draw a line from the workbench picture to the appropriate part of Cindy Swallowtail.

VOCABULARY: mating, claspers, compound eyes, tastes, tarsi, fertilized, carrot plant

CARING FOR CATERPILLARS (p. 13)

DISCUSSION: Can the children recall the name of the Monarch's food plant? Review what they know and/or have experienced with this plant. (color, milky liquid, seeds and seedpods)

LEARNING ACTIVITY: It is possible to start your own milkweed plants in your home or classroom. Follow these planting pointers for successful "butterfly gardening."

1) Obtain seeds from a ripened milkweed pod.

2) Fill a 6" or 8" clay pot with light potting soil, about 3" from the top.

3) Place six seeds in the pot; spread out as much as possible.

4) Cover with 2" of light soil; water sparingly with spray (misting) bottle until damp. (Too much water does more harm than not enough.)

5) Cover the pot with plastic wrap until seedlings have sprouted.

6) When plants are 4" in height, transfer to individual pots or garden.

These are sun-loving plants just like their butterfly friends. Growing milkweeds in a home garden will encourage Monarch visitors all season long.

VOCABULARY: planting, seedlings

COLOR GUIDE TO KEEPABLE CATERPILLARS (pp. 14-15)

DISCUSSION: Plants in the carrot family are the favorite food of the Swallowtail Butterfly (p. 14), and Woollybear (p. 15), a fuzzy moth caterpillar. What part of the carrot plant do the children like to eat? What part would the caterpillars eat?

LEARNING ACTIVITY: The children will want to look for their own caterpillars and food plants. First, have the children complete the Caterpillar Guide on pages 14 and 15, by carefully following the coloring directions under each picture.

Next, determine if the food plants mentioned grow in or near your schoolyard. Have the children check at home, too. This activity can be done anytime if you live in a climate that is warm all year long; if not, late spring, summer and fall are the best growing periods for these plants. Should you locate Queen Anne's Lace, the wild flower of the carrot plant (pictured pp. 11 and 14), be sure to pull one stem to let the children smell the roots; the carrot smell makes the discovery definite.

Leaf samples of food plants can be pressed with an iron between two sheets of wax paper. For permanent samples place the waxed leaves on tagboard and cover with clear Con-Tact. Be sure to have your "food-plant detectives" label their finds.

Note: Should caterpillars be located while the children are initially identifying food plants, read pages 16 and 18 for care instructions.

CATERPILLAR SUBSTITUTES: If you live on the West Coast, look for the **Anise Swallowtail** as a substitute for the Black Swallowtail. The caterpillar is similar, but feeds only on anise and fennel, which are also in the carrot family.

Cecropia and Luna Moths are found from the Midwest to the East Coast. If you do not live in this area, the **Polyphemus Moth** is an excellent substitute (see p. 18). These moths occur throughout the United States and Canada. This caterpillar feeds on a variety of trees, especially oak, maple, birch and hickory. Their round cocoons feel like stiff paper and are found hanging on the branches of the food plant.

VOCABUALRY: Black Swallowtail, Queen Anne's Lace, Cecropia Moth, willow, purple plum, lilac, wild cherry, Woollybear, Isabella Moth, Luna Moth, hickory.

HAPPY HUNTING HINTS (pp. 17-18)

DISCUSSION: Discuss the "Do's and Dont's."

LEARNING ACTIVITY: Enjoy hunting for caterpillars!

VOCABULARY: uprooting, droppings, poison ivy, Polyphemus, Cynthia, parasites, well-ventilated.

BECOMING A BUTTERFLY (song) (p. 19)

DISCUSSION: Have the children ever tried on clothes that were too small? How did the clothes feel? This is similar to what happens when a caterpillar has been eating leaves, and its skin does not grow but stays the same size. Soon the caterpillar's skin is too small and must be shed or "molted." A larger skin is waiting underneath the tight outer skin. After molting, the new skin must dry before the caterpillar can go back to eating.

LEARNING ACTIVITY: Sing the song to discover more about caterpillars.

(1) Caterpillars eat leaves until their skin feels tight.

(2) Caterpillars make sticky silk to hold onto when wiggling out of an old skin.

(3) Caterpillars eat the molted skin because it is made of the protein chitin, just like their eggshells.

Answer Key: Middle leaf is 1, caterpillar eating
Right leaf is 2, caterpillar molting
Left leaf is 3, caterpillar eating molted skin

VOCABULARY: silk, molting

BUTTERFLY SONG (cont'd.) (p. 20)

DISCUSSION: Do the children recall how many moltings a caterpillar usually has? The fifth molting is very important. At this time the caterpillar's sticky silk is used to fasten itself to a branch or stem. Once the fifth molting occurs, the caterpillar is seen as a green pupa (PEW-pa). The butterfly caterpillars protect their pupa with a clear case or chrysalis (KRIS-a-lis) made of chitin. A moth caterpillar usually forms a chitinous case and a silk cocoon to protect its pupa. All the final changes take place inside the chrysalis or cocoon; ultimately, an adult butterfly or moth emerges.

LEARNING ACTIVITY: Have the children find the silk in the pictures. It's time to sing the last two verses of "Becoming a Butterfly."

Answer Key: The Black Swallowtail has a silk "safety belt" and a silk button at the bottom.

The Monarch hangs from a silk button.

The Cecropia's cocoon is made of silk threads.

VOCABULARY: pupa, chrysalis, cocoon

RECORD KEEPING (pp. 22-23)

LEARNING ACTIVITY: Encourage this important skill in your young scientists. Duplicate pages 22 and 23, so they can keep a record every time they raise a marvelous Monarch Butterfly.

BIRTHDAY INSTARS (p. 24)

DISCUSSION: Read page 24 and discuss the seven instars which mark the changes in a butterfly's life cycle.

LEARNING ACTIVITY: Have the children number the stars on page 24 in order from one to seven.

Answer Key: (p. 24) ③ ④
⑦ ⑥ (top)
① (middle)
② ⑤ (bottom)

VOCABULARY: instar

THE JOURNEY ENDS AND NEW LIFE BEGINS (p. 25)

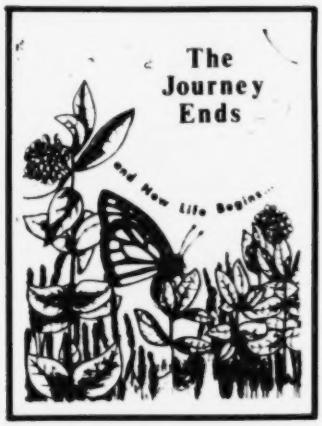
DISCUSSION: Many living things begin as eggs. Can the children name a few? A butterfly, too, starts its life as a tiny egg. The mother butterfly lays an egg on a plant, the favorite food plant of the caterpillar that will hatch from the egg. How do most plants begin? Can we call a seed or an egg a living thing? It cannot move by itself but can it grow and change?

LEARNING ACTIVITY: This second puzzle pictures the seed and the butterfly, both **living things, making changes**. Silky Seed has sprouted roots and grown into a young milkweed plant. Mandy Monarch is laying an egg on one of Silky's new leaves, since Monarch caterpillars like to eat milkweeds.

Page 25 can be duplicated, assembled and used as a back cover for the child's booklet. (See instructions for first puzzle.) By taping the front cover to the back, each child has a special folder to hold the remaining activity sheets as they are completed.

EXTENDING ACTIVITY: Glue each part of the puzzle to a piece of tagboard the same size. Color and cover with clear Con-Tact for a reusable puzzle depicting living things growing and changing.

VOCABUALRY: egg, food plant, caterpillar, sprouted, roots



IMPORTANT NOTE

Should it ever become necessary to care for an injured butterfly, you can feed it a mixture of honey (1 T.) and distilled water (1 cup); the mixture can be stored in a plastic or glass container for one week. Simply soak a piece of white paper toweling in the honey mixture; place on a plastic lid. The tarsi on the butterfly's legs will taste the honey on the toweling. If the butterfly is hungry, it will uncoil its proboscis (p. 21) and sip the "nectar." Moths, like the Cecropia, do not have mouths; they live on stored body fat just long enough to mate and begin another generation of these handsome giants.

It is the intent of this book to encourage the interest of young children in science by providing information on raising butterflies and moths. If the methods outlined are followed, they will serve to protect the species being raised, subsequently aiding nature. The ultimate objective is releasing a flying adult, thus returning to nature a beautiful living thing that was meant to fly free.

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